

# Forestcast Season 2: Backcross- Episode 3: The Past, Present and Future of American Chestnut

Audio Transcript

James Mullins

The chestnut tree was the main thing for everything. They used it for food, they used it for firewood, used it for shingling, fences. When we lost the big chestnut, we lost the best tree we had, everybody knows that.

Harding Ison

They didn't last long. They started dying—a year or two or three there, and they were all gone. They had blight kill them all out, you know?

Ella Preston

I don't like to lose a native tree of any kind. They have their place in all of our lives.

Jonathan Yales

Welcome back to Backcross, the story of how resistance breeds restoration. This is Part 3: the past, present, and future of the American chestnut.

A hundred years ago, the American chestnut was the redwood of the East. It was big, and it was everywhere, especially in the southern Appalachians. But, today, it's just a shrub, and is, functionally, extinct.

Leila Pinchot

They're wonderful photos of chestnuts in the Appalachians, in cove forests where they grew their biggest. And you would just have these enormous trees that could be even up to, say, six feet in diameter—just tremendous trees.

Jonathan Yales

This is Leila, a research ecologist. We met her back in Delaware, Ohio, in Part 1.

Leila Pinchot

They would have these long, kind of, furrows that would extend up the length of a tree, similar to red oak, but even deeper. And, they could reach heights of 100 feet, and they have these beautiful oval shaped leaves with teeth, and they're really quite distinctive—they don't look like anything else. But, if you see a chestnut in the forest today, it's likely to be quite short, maybe, six feet to 15 feet, if you're lucky, and still—because they're impacted by blight—they'll often be present in sprout clumps. So, you might see 10 or more stems all coming from the same root system. So, in essence, it looks more like a

bush than a tree today. But, it's still there, it's still surviving, and it means we still have germplasm that we can access for restoration.

Jonathan Yales

With chestnuts having gone through such a dramatic decline, restoration has been a priority, for a while now. And, it's been a restoration effort unlike many others. It's been one of the most passionate efforts an American tree has ever seen. And, Leila, she plays her part.

Leila Pinchot

So, I look at different silvicultural treatments: how do we manage the forest, what light levels are necessary to establish planted American chestnut? And so, I work with foresters to think about different treatments that they utilize for other objectives—for instance, oak regeneration—and test how chestnut establishment does in those types of treatments. So, it's very practical thinking about how foresters can manage their woods to get chestnut to live and thrive in those woods.

I've been interested in chestnut since I was, probably, about 20 and my father showed me a relatively large chestnut—maybe nine or 10 inches in diameter on our property in Pennsylvania—that was a survivor. And, he told me about the story of chestnut, and introduced me to Dr. Sandra Anagnostakis, who worked for the Connecticut Agricultural Experiment Station in New Haven, and I volunteered for her for a winter while I was in college and just fell in love with the history of the species, the nostalgia of the species, and the research that was required to restore it.

Jonathan Yales

Now, to restore any tree, to save any tree, someone—who's not a scientist—has to want that tree to be saved. And, through the years, chestnut has had more of those people than most trees usually get. And, it's that sentimentality that has kept the big chestnuts alive, even though no one's seen one of these big trees in generations.

They've been kept alive, not on the landscape, but in our minds. And it's that nostalgia that seems to be part of what has kept this tree from ever fully being lost.

Leila Pinchot

I think the nostalgia around American chestnut is very powerful, and you know, fueled in part by photos of old chestnuts. There's stories about how people use the species and how it sustained communities in the southern Appalachians, and it's just this link to a way of life that no longer exists that, I think, is just very powerful and captivates people.

Jonathan Yales

Another factor, other than our sentimentality for the tree, that has kept the chestnut from ever fully disappearing is biological.

Leila Pinchot

So, you have this cycle that occurs over and over again of the root system sending up new shoots, the blight finds it, kills it back, and it just happens over and over again. But, because of that, we have millions of chestnuts that are still out on the landscape.

Jonathan Yales

Biologically, and nostalgically, chestnut is one of the most resilient trees. Today, we'll dive into both the nostalgia, and the science, of one of America's most-missed trees.

To understand the nostalgia of chestnut, as well as today's chestnut restoration efforts, we first have to start in the past.

And, the people you heard at the start of this episode, they're going to help us do that. They were actually there when the chestnut was there, nearly a hundred years ago, in the early 1900s in Kentucky and Virginia at the heart of the Appalachians.

Bethany Baxter

So, I kind of like to start—will you just tell me your name, when you were born, and where you live, where you are from?

Ella Preston

Well, my name is Ella Preston, and I was born November 26, 1916.

Jonathan Yales

In 2008, Bethany Baxter traveled across the Appalachian mountains recording memories of those who were the last to live among the big chestnuts. It was all for the University of Tennessee-Chattanooga and her American Chestnut Oral History master's thesis.

Bethany Baxter

Um, well, did you have anything you wanted to go ahead and say that you—I saw you had those notes there.

Ella Preston

No, I made some notes about what I could remember about how a chestnut might have affected my life or how I came in contact with any type of these native chestnuts.

Bethany Baxter

Do you want to go ahead and say some of that, or do you want me to start asking questions?

Ella Preston

Well, it might not be what you want. You could turn that off and let me talk...

Bethany Baxter

I've got as much room as—I'm not worried about room, and it sounds great.

Ella Preston

Let me start out, and then you can delete it if you don't want it.

Bethany Baxter

Okay.

Jonathan Yales

To personally remember seeing a big chestnut today, you would have to be in your late 90s, or 100s—leaving almost nobody left today to tell the stories of the big chestnuts.

In the early 1900s, the chestnut was wiped from our country's landscape, and over the past few decades, it has also been wiped from our country's collective memory, as those who lived among the trees began to pass.

But, here in Bethany's tapes, their memories live on and so does the chestnut.

Ella Preston

One exciting, cold, frosty morning when I was about thirteen, I heard my Uncle John and a man above us called, George, were taking a bunch of us girls to Bad Branch to pick up native chestnuts, and that was a rarity. We were going to camp, spend the night, and pick chestnuts up and bring them back the next day. So, we gathered up all who were going—all girls, and these two men that were much older than us—and George took a horse. And we called him when we got up there, and his daughter came—she was my best friend at that time.

And the next morning, away we went. We had to walk across Pine Mountain, and we followed the path. We didn't follow the old-time wagon road, but we turned up a branch about a mile above us, and up the mountain we went. We were quite a rowdy bunch going. We were fresh, and all of us young except these two older men, and we picked up chestnuts as we went.

When we got over across Pine Mountain on the other side to a branch they called, Bad Branch—which is called that until this day—by then it was getting late, so we looked for a place to camp and George had lived in that area when he was first married, so he could pretty well tell us where to go, and we found a nice big cliff, built us a bonfire, and broiled our meat, and had a hilarious supper. Of course, by dark we were ready to go to bed, and we fixed us a bed. These two men were pretty good singers, and they started singing old time songs and they made that valley ring they sang so loud, and they sang us all to sleep.

And we laid down spoon-fashion, put the quilts over us, and when we woke up, they were laughing. You could of have heard them half a mile, they were hilarious. And, what had happened during the night, one of the girls had passed some gas where she had eaten some raw chestnuts. And, of course, we all looked at each other, we was afraid, 'Is it us? Is it us?' And next day, they selected one of our group and said that was the one that did that, which we always wondered, 'Was it me? Was it me?'

And then we ate breakfast and started picking up chestnuts, in earnest, next morning. George knew just where to take us, and he found all the chestnuts. And I really worked and picked up. When the day was getting pretty late, we had to start home, because we had nearly five miles to get us to walk. And I had so many chestnuts, I couldn't carry them. So, George was sorry for me, and he put them on that horse and carried them home. And next day, my father had to go up to George's home and get my chestnuts, so he brought them home and my mother put them in the closet up next to the chimney where it was good and warm.

And time passed, I was in school, and they were busy with the farm work. My mother would say, 'I saw some little white worms crawling around. Wonder where they come from?' So, I didn't know. Every day for about a week, she would mention something about seeing the worms. Finally, it dawned on her what had happened, and those chestnuts had exploded in millions, seemed like, worms—had all the eggs hatched in them where it was warm, and they hadn't done anything to stop it.

So, that ended my chestnut—my native chestnut hunt. They had to throw all my chestnuts away, and that ended—by then they were all dead, so—the trees everywhere. So, that ends my camping.

Bethany Baxter

That's a great story. Gosh.

Jonathan Yales

Bethany's tapes are filled with memories like these. As I spent days listening through these tapes, I noticed a trend. Like Ella's own story, the nuts tended to be one of the most remembered aspects of the chestnut.

James Mullins

I'd say the chestnut tree kept a lot of mountain people from starving to death. Because if you was out in the mountain, you wasn't going to starve to death because there was too many chestnuts.

Jonathan Yales

That's James.

James Mullins

You might get tired of eating them, but you wouldn't starve to death.

Jonathan Yales

James lived in Virginia, about 50 miles from Ella.

Harding Ison

Well, they didn't have that for lumber, and they didn't have that to make their rails out of, and we used to use it for firewood, and we like to play [indistinguishable] with them. And we could gather them and boil them or bake them, that'd be something to snack on, you know. I guess that was the most valuable timber in these hills, that chestnut tree.

Jonathan Yales

This is Harding.

Harding Ison

My name is Harding Ison, I grew up on Kingdom Come [Letcher County, Kentucky], and I'm 85 years old. I was borned 1/18/23.

Jonathan Yales

Harding and Ella grew up and lived right near each other, and Harding, man, he liked to sing.

Harding Ison (singing)

I was born in the hills of Kentucky, on a mountain farm on Kingdom Come.

All that I am, or ever hope to be, I owe it all to daddy and mom.

Daddy worked hard in the [indistinguishable] coal mine, from early dawn, till late at night.

I recall the little things they taught us. We were rich, but we didn't have a dime.

Jonathan Yales

Now, what actually was it that took down all these trees? Why were we losing the trees in the first place?

Leila Pinchot

Well, chestnut has a couple of different pathogens that have nearly wiped out the species. Ink disease is a root rot which kills the root system of the chestnut, and came here first—sometime in the early to mid-1800s—and killed chestnut in the Piedmont area—like the Carolinas—where it had wetter soil. And then, chestnut blight—*Cryphonectria parasitica*—came over, late-1800s, and that kills the above-ground portion of the tree, and you know, killed millions of chestnuts within, probably, 40 or 50 years.

Jonathan Yales

And, was there a reason it wasn't able to be—was it stopped in any sense? Was it slowed down? What was it like, early-1900s, for fighting a pathogen..

Leila Pinchot

Fighting blight, in particular? No.

Jonathan Yales

And, was there a reason it wasn't able to be—was it stopped in any sense? Was it slowed down? What was it like, early-1900s, for fighting a pathogen?

Leila Pinchot

Fighting blight, in particular?

Jonathan Yales

Yeah.

Leila Pinchot

Well, there was a tremendous effort—particularly in Pennsylvania—to stop the spread of chestnut blight. The Chestnut Blight Commission has a wonderful series of documents that describe these efforts, and they cut down thousands of chestnut trees in Pennsylvania beyond the extent of the blight. But, unfortunately, that didn't deter the blight. It continued to spread throughout the state, and throughout the range of chestnut, and ultimately killed most large chestnuts throughout the range.

Jonathan Yales

And, when was, sort of, the peak of loss, roughly?

Leila Pinchot

It really depends where you are geographically. Up in the Northeast, it was a little bit earlier, probably the 19-teens and -20s, into the -30s. Down south, it was a little bit later, '30s, maybe into the '40s. But still, it happened relatively quickly. When you think about a 40-year period where a species is nearly exterminated, it's pretty incredible.

Jonathan Yales

Even with a near extermination, chestnut still never completely disappeared. Due to a unique biological cycle between the tree, those diseases, and the environment, the big trees were taken down, but the small trees, they were still able to live.

Leila Pinchot

The blight only kills the above ground tissue, it doesn't kill the root system—and ink disease is spotty in its distribution—so there are still millions of small chestnuts throughout the species range that take the form of small scraggly sprouts that grow up, and then when their bark reaches the point where it starts to crack, or there's a wound on the bark that the fungus—which is really ubiquitous in the ecosystem—finds that wound or the crack in the bark, infects the tree, and then kills it down to the ground. But, the root system remains alive. So, you have this cycle that occurs over and over again of the root system sending up new shoots, the blight finds it, kills it back, and it just happens over and over again.

Jonathan Yales

It's this cycle—a biological cycle of death, and also new life—that is what makes chestnut one of the most resilient trees in America.

Because, if you cut down a pine tree, what happens? It dies. But, if you cut down a chestnut, it just keeps living.

Jonathan Yales

Now, moving from the past of the chestnut into its present, who is owning today's restoration work?

Well, as you know, there's two sides to most tree restoration projects: resistance breeding and restoration research. Leila, she's involved in the restoration.

Leila Pinchot

I focus on the reintroduction aspect of American chestnut restoration. So, that really assumes that other people, other groups, will develop trees that are tolerant to blight and *Phytophthora* for certain areas, and that's a tremendous assumption, and a tremendous amount of work that other people are doing, but I'm waiting for that to happen, so that once we have a tree that is tolerant or resistant to the blight, we know how to get it back out into forested ecosystems, specifically, managed forested ecosystems.

Jonathan Yales

But, who's owning the breeding side? It's been mostly a story taking place outside the Forest Service.

Well, as you know, there's two sides to most tree restoration projects: resistance breeding and restoration research. Leila, she's involved in the restoration.

Leila Pinchot

The other big group that's been involved with American chestnut restoration for decades is The American Chestnut Foundation. They have a breeding program—a backcross breeding program—and they breed chestnuts themselves. The actual staff does in Virginia, but then they also have this wonderful network of state chapters run by volunteers. So, just people who are excited about chestnut, who want to see the species back out on the landscape have had been breeding chestnut themselves to help toward this goal. So, it's really a cool organization, and I'm not seeing anything similar to that in terms of just the sheer number of people that are involved in this one species just because they're excited about it. So, it's really wonderful. I just came back from their meetings, so I'm, like, still feeling that energy from that group.

Jonathan Yales

To fully understand how The American Chestnut Foundation has bred chestnut, we first have to understand a familiar word.

Leila Pinchot

To understand the history of chestnut restoration, you have to understand the backcross breeding program, which was first utilized by the Connecticut Agricultural Experiment Station, and then by The American Chestnut Foundation. And, the whole point of this is to breed a tree that is mostly American, but has just enough genes from Chinese chestnut—which are tolerant to chestnut blight—to be tolerant. So, you want a tree that acts American ecologically, but has blight tolerance from the Chinese parent.

Jonathan Yales

What's actually taking place between when you have the American and the Chinese—how do you “breed” it?

Leila Pinchot

So, you actually cross them, where you take pollen from one of the parents and you basically put it on the flowers—the female flowers—of the other parents to cross them. So, this is all natural, this could happen if they were just growing next to each other, they would pollinate each other. And, the progeny from that first cross between American and Chinese are called F1s, and they're moderate in tolerance to blight. They're also moderate in terms of their American versus Chinese characteristics, because they're really 50/50 split. Then, the next step is, you take that F1 and you cross it with a new American chestnut. And, the point here is to dilute the Chinese percentage, because we don't want the morphological or ecological characteristics of the Chinese species—they grow a little bit differently—we want this to be an American chestnut. And, once they're big enough, we actually inoculate them with a blight to test them for tolerance. And, and I say, ‘we,’ but this is not something I do, so this is The American Chestnut Foundation, currently. And, they pick the trees that are most tolerant and also look the most American,

and then they breed them again with another American tree, and then they do that same thing and breed it again with a new American chestnut and each time trying to dilute the Chinese percentage of the progeny, increase the American percentage, yet, hang on to that blight tolerance of the Chinese. And then there are two generations where you cross the progeny together to increase tolerance.

Jonathan Yales

And, what's the timescale—like when you say you jumped from, you know, one of these iterations of the tree to the next, is that—how many years or days or months?

Leila Pinchot

Each generation takes, at a minimum, five years. And that's when they're grown in open settings with a lot of fertilizer.

Jonathan Yales

Ideal situation? When everything goes right.

Leila Pinchot

Yes, so it takes a very long time, which is part of the problem.

Jonathan Yales

And once you work your way to that final tree, is that when you come in?

Leila Pinchot

Yes! Yes, so, when we get that final tree that—according to the original model was 15/16ths American, 1/16th Chinese—looks American but has a tolerance from the Chinese parent, once those became available, that's when my research would become pertinent: how do we get those individuals back out into the forest?

Jonathan Yales

Before we get to that though, first, I have an update.

Recently, The American Chestnut Foundation has found that this type of backcross breeding will not alone produce a blight-resistant tree that is mostly American.

Leila Pinchot

It turns out from new research, that The American Chestnut Foundation—their scientist has published recently—that there appears to be a trade off between blight tolerance and the percentage of the genome that is American chestnut. So, the more American the hybrids have, the less blight tolerance they have. And, it's probably not possible to end up with a tree that's mostly American chestnut, and have blight tolerance. So, that's the conundrum here, unfortunately.

Jonathan Yales

So, The American Chestnut Foundation has been working closely with the American Chestnut Research & Restoration Program at SUNY College of Environmental Science and Forestry to now breed blight-

resistant transgenic chestnuts with both American chestnuts found in the wild and these backcrossed chestnuts.

So, now, back to our story.

No matter what type of resistance tree we have, how do we get it back into the forest?

Seems simple, right? you just take that tree and put it back into the forest? Well, no. Because, remember, it's been almost a hundred years since the blight began to roll through these trees. Too much time has passed, too much change to the landscape has occurred. We can't simply drop a tree back into the forest.

Leila Pinchot

It's important to understand the context, both of the landscape where chestnut was once dominant and now it isn't, and how the landscape itself has changed. Because, it's changed very dramatically since chestnut was here. And, how does chestnut now fit into the current landscape? How can we use it to help address current challenges that we're facing?

Jonathan Yales

And, to add to all that landscape change, our tree has also changed a lot.

Leila Pinchot

The tree that we're reintroducing is not the same as the original American chestnut. It will not be immune to the blight. So, it will still be impacted by blight, but hopefully will be highly tolerant, but it's not the same tree. So, it may not grow—we may need to find the very best environments to grow it because it has this slight handicap of still being impacted by blight. And so, I'm really interested in what environments optimize survival, what environments optimize the blight tolerance of the species, in addition to what silvicultural treatments—what management approaches—can we use to help this tree become established and eventually reproduce and spread.

Jonathan Yales

And, do you have answers for those?

Leila Pinchot

So, I gave a presentation about this, about my work, and the main take home message was this type of research is so long-term, you just don't get answers in five years, in 10 years. When thinking about, you know, silviculture and forest management approaches, you need to study that stand for 30-plus years before you really understand the dynamics.

Jonathan Yales

The more I hear about this chestnut story, the more I see it as the story of just two things—the two things Leila just stressed: time...

Leila Pinchot

...this type of research is so long-term, you just don't get answers in five years, in 10 years...

Jonathan Yales

And, change.

Leila Pinchot

...the tree that we're reintroducing is not the same as the original American chestnut...

Jonathan Yales

And, what is science, but the study of change over time?

Maybe every tree restoration effort is really just trying to understand, expedite and assist change and time? And, maybe, the reason the chestnut has survived so long, through so much time and change, is because it has pushed back against those two factors better than most trees?

Ella, James, and Harding's nostalgia for chestnut, pushes back against that time. While the tree's biological resistance —it's endless resprouting—pushes back against that change.

Jonathan Yales

Now, Leila's made it clear, we're probably never getting back to the past of Ella, Harding, and James, in terms of the abundance of big chestnuts out on the landscape. Because, if chestnut wants to continue its push against time, it too will have to change, as does our own vision for its future.

Leila Pinchot

I think we definitely need a new vision for what chestnut in the U.S. will look like once we have a, you know, improved population that can be planted out. It probably won't look like what chestnut looked like on a landscape a hundred years ago because the population at that point was responding to land use pressures of the day, for instance, wide-scale deforestation led to increases in chestnut population. So, it was probably kind of artificially inflated at that point in time, anyhow. So, it's not really a good model for moving forward—how we want to see chestnut out on the landscape. But, we have so many forest management challenges today that, I think if we can use this species as a tool to help address some of those challenges, that's going to be key. If we can use it to engage landowners in actively managing their forests—and that's already been done with The American Chestnut Foundation—finding folks out there who have small parcels of land who love chestnut, if it can be used as a tool to better manage those small properties. I think, there'll be different visions for what restoration looks like depending on the landowner, different scales on the National Forest System, it could look very different than it looks on a small, private woodlot, for instance.

Jonathan Yales

In order for anything—a single tree, a species, a person—to survive large swathes of time, it has to change. It's the reality of life. It's also the story of life. And, it's also the foundation of ecology?

Leila Pinchot

You know, if you're in forest ecology or forest management, you just understand that what you're doing is trying to impact an ecosystem that is constantly changing—always changing—I mean, there's never any moment when it's not changing. So, anything that you do that's the long term, results are really

unknown in the short term, and what the results that you may see in 10 years may be quite different from what you see in 20 years. So, there's really no—almost no, endpoint—that's a little extreme, but you're just trying to see how things change and following that change over time.

Jonathan Yales

Any restoration research can be simply summed up as that: using time to track how things change. As can the work of probably every ecologist ever. It's done in hopes of understanding those changes, getting ahead of them, and hopefully, unlocking how to successfully, and appropriately, impact an ecosystem's future for the better.

But, the problem is, it demands a lot of time—more than we usually get. We humans, we only get so much time to understand, and to change, before time catches up to us.

James Mullins

I remember right on top of the mountain my grandpa cut a big one. It was about eight foot across. And he told us boys, he said, 'Now, when I die,' he said, 'I want to be buried in this stump.' We said, 'Well, grandpa, we'll put you in it!' When he died, I remembered, we had to take a shovel and chopped right down through that big stump and dug his grave through it.

Bethany Baxter

So, let me get this straight, he was buried inside the stump?

James Mullins

I mean, it was cut off the top of the ground, you know. We chopped right down through the middle of it. We cut a hole right down through it, you know, to dig the gravesite. But, I would have liked to have seen that big tree there the way he described it. It was right on top of the main top of the ridge. And he said that tree was so big you know, and so tall, and he cut it down for lumber and pulled it off that mountain. We put a six-foot grave through it, you know, about six-to-eight foot long, and it still had the sides on it.

Bethany Baxter

Wow, that's amazing!

James Millins

We cut right down through that stump and shoveled him out of there and dug him out of there and put grandpa in there where he wanted to be. And, my daddy went back and put that chestnut there, you know. That chestnut tree's right there, right today, you know that Chinese chestnut. It shades about the whole graveyard.

Jonathan Yales

Over the next decade, time will at last, unfortunately, wipe clean all of these remaining memories of the iconic American chestnut. And, that's why oral history projects such as Bethany's are so important. They're a way we push back against time. Because, it's close behind all of us, all the time.

And, it caught Ella, who passed in 2014, at the age of 97.

Bethany Baxter

Well, that's all the questions that I really have. Is there any other things that you can think of that you would want to mention?

Ella Preston

You've pretty well picked my brain.

Bethany Baxter

Good. That's what I like to hear.

Jonathan Yales

And, I'm unsure if James is still alive today, but I hope so. He'd be in his mid-70s.

James Mullins

You know, if they can go to the moon and everything, they should be able to restore that tree, right? Don't you believe that?

Bethany Baxter

Yeah, I believe that.

Jonathan Yales

As for Harding, he passed in 2008, at the age of 85. But, four months before he died, he sang—a song about all of this, and all of us.

Harding Ison [singing]

Time has made a change since my childhood days. Many of my friends have gone away.

Some I'll never mourn in this life shall see. Time has made a change in me.

In my childhood days I was well and strong. I could climb the hill sides all day long.

I am not today what I used to be. Time has made a change in me.

When I reach my home in that land somewhere. Meet my friends that waved me over there.

Free from pains and care, I shall ever be. Time has made a change in me.

[Talking] Time has made a change hasn't? I remember I could run atop that hill right now, and I couldn't even get up in there right now.

Time has made a change.

Jonathan Yales

Like the resprouting cycle of the chestnut, oral histories and ecologists like Leila, never fully let go of chestnut's past and present. Yet, due to the realities of biology, we have to pay a price in order to hold onto the past and present: a price of change.

Which is probably worth paying in the end, because it means you're owed some sort of future. A future, yes, foreign to the past, and different from the present, but a future which not everybody—or everything, or every tree—gets.

Thanks for listening.

Jonathan Yales

This episode was produced, written and edited by me, Jon Yales. My editors at the Northern Research Station were Jane Hodgins, Sharon Hobrila, and Gina Jorgensen.

Major thanks to Bethany Baxter, and the University of Tennessee-Chattanooga, for allowing us to use Bethany's interviews from her American Chestnut Oral History Project.

Go to our website, or our Twitter, if you would like to see pictures of Ella, Harding and James. And, search 'American Chestnut Oral History Project' online to hear more voices and support Bethany's research.

Also, a very special thanks to Leila Pinchot of the Northern Research Station.

And, maybe you're curious: 'When can I buy a blight-resistant American chestnut tree?' Well, back when Leila first started, the answer was 'in 10-15 years.' Fifteen years later, today, the answer is 'maybe 5-10 years for members and partners of The American Chestnut Foundation, and 15-30 years for everyone else.' Even though the timeline's been pushed out, Leila's never been as hopeful about the prospect of having a blight-resistant chestnut as she does today.

Finally, thanks to the Michigan State University Department of Entomology for helping bring this podcast to you once again.

And, most of the music in this episode was by Blue Dot Sessions, but the opening song is Lee Sexton of Letcher County, Kentucky, recorded by Bethany Baxter.

This podcast is produced by the Forest Service, an agency of the U.S. Department of Agriculture, which is an equal opportunity provider, employer, and lender.

Thanks for listening. And, see you next week.